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JAVANESE SKETCHES. II.

A JAVANESE VILLAGE.

Sketch of the Natives.

The natives of Java belong to the widely-diffused race of the Malays. Their stature is rather below the middle size: they are well shaped, and their only attempts to improve upon nature consist in the ridiculous custom of compressing the waist within the narrowest limits, (a custom unfortunately not confined to the Javanese alone,) and the absurd practice of filing and blackening the teeth, it being considered disgraceful to allow them to remain "white like a dog's." Deformity is rare among the Javanese. The forehead is high, the eyebrows well marked and distant from the eyes; the colour of the eye is dark; the nose small and somewhat flat; the mouth is well formed, but the lips are large, and are further disfigured by the use of betel*. The cheek bones are usually prominent; the beard scanty; the hair of the head lank and black, but sometimes waving in curls, and partially tinged with a deep reddish-brown colour. The countenance is mild, placid, and thoughtful, and easily expresses the various passions and emotions of the mind. Their complexion may be considered rather as yellow than copper-coloured or black.

The females are not so good-looking as the men, and to Europeans many of them appear very ugly. But among the lower orders Raffles attributes much of this deficiency of personal comeliness, to the severe duties which they have to perform in the field, to the hardships they have to undergo in carrying oppressive burdens, and to exposure in a sultry climate.

In manners the Javans are easy and courteous, and respectful even to timidity; they have a great sense of propriety, and are never rude or abrupt. In their deportment they are pliant and graceful, the people of condition carrying with them a considerable air of fashion, and receiving the gaze of the curious, without being at all disconcerted. In their delivery they are in general very circumspect, and even slow, though not deficient in animation when necessary.

The cottage or hut of the peasant is usually formed of bambus, flattened and plaited together, with a roof of long grass or leaves. It includes a room partitioned off for the heads of the family, and an open apartment on the opposite side for the children. Light is admitted through the door; and this is not found to be inconvenient in a climate where all domestic operations can be carried on in the open air, and where shade from the sun, rather than shelter from the weather, is required. The women perform their usual occupations of spinning or weaving on an elevated verandah in front, where they are protected from the rays of a vertical sun, by an extended projection of the pitch of the roof. These cottages are never solitary, but congregated into villages of greater or less extent. To each cottage is attached a garden, which the cottager regards as his peculiar patrimony, and cultivates with peculiar care.

* See an article on the *Betel Chewers of the East*. *Saturday Magazine*, Vol. XIX., p. 77.

He labours to plant and rear in it those vegetables that may be most useful to his family, and those shrubs and trees which may at once yield him their fruit and their shade; nor does he waste his efforts on a thankless soil. The cottages or assemblage of huts, that compose the village, become thus completely screened from the rays of a scorching sun, and are so buried amid the foliage of a luxuriant vegetation, that at a small distance no appearance of a human dwelling can be discovered, and the residence of a numerous society appears only a verdant grove, or a clump of evergreens. Nothing can exceed the beauty or the interest, which such detached masses of verdure, scattered over the face of the country, and indicating each the abode of a collection of happy peasantry, add to scenery otherwise rich, whether viewed on the sides of the mountains, in the narrow vales, or on the extensive plains. In the last case before the grain is planted, and during the season of irrigation, when the rice fields are inundated, they appear like so many small islands rising out of the water. As the young plant advances, their deep rich foliage contrasts pleasingly with its lighter tints; and when the full eared grain, with a luxuriance that exceeds an European harvest, invests the earth with its richest yellow, they give a variety to the prospect, and afford a most refreshing relief to the eye. The clumps of trees, with which art attempts to diversify and adorn the most skilfully arranged park, can bear no comparison with them in rural beauty or picturesque effect.

Every village forms a community within itself, having its officers and priest, and a temple for religious rites. The dominant faith is that of Mahommed, mingled with many superstitious observances retained from the religion of their ancestors. The houses of the petty chiefs are distinguished by having eight slopes or roofs, four superior and four secondary. The houses of the chiefs or nobles are generally distinguished by their greater size. All the villages are fenced in by strong hedges of bambu and other quick-growing plants. In the larger towns and capitals much attention is paid to the due preservation of broad streets or roads, crossing in different directions.

The furniture of the huts is very simple; the bed is a fine mat with a number of pillows, with some party-coloured cloths generally extended over the head, in the form of a canopy or valance. They have neither tables nor chairs, but their meals are brought on large brass or wooden waiters, with smaller vessels of brass or china ware for the different articles served up. They sit cross-legged, and in common with other Mahommedans only use the right hand at their meals. They usually take up their food between the finger and thumb, and throw it into the mouth.

In the dwellings of the higher classes the articles of furniture are more numerous and less simple; and in the European provinces the natives have adopted much of the furniture and many of the habits of Europeans.

The men of the lowest class generally wear a pair of coarse short drawers, reaching towards the knee, with the jârit, or cloth, folded round the waist, and descending below the knees like a short petticoat. This cloth is always tucked up close round the waist while the labourer is at work or moving abroad, but loosened and allowed to descend to its full length in the presence of a superior. It is fastened round the waist by a belt. The Javans generally wear a jacket with short sleeves: this is either white, or more frequently of light and dark-blue stripes. A handkerchief is always folded round the head somewhat like a turban. While abroad they usually wear over it a large hat of leaves, or of the split and plaited bambu, which shelters them, like an umbrella, from the sun and rain. A coarse handkerchief is usually tucked into the waist-band, or a small bag is suspended from it, containing tobacco, betel, &c.

The dress of the women is not unlike that of the men: round the body is rolled a cloth, and they also wear a loose gown, of a blue colour, reaching to the knees, with long sleeves buttoning at the wrists. Both sexes wear finger-rings: those worn by the men are of iron, brass, or copper: those of the women, of brass or copper only.

The Javanese dress varies of course with the rank of the wearer. We need not describe it further, since a general idea of the costume of the different classes may be obtained by examining the figures which accompany these articles. Neither men nor women cut their hair, but allow it to grow to its natural length. The men usually gather it up on the crown of the head, twist it round, and fasten it by means of a semicircular tortoise-shell comb fixed in front; but among the higher classes, it is considered a mark of respect to let it flow in curls in the presence of a superior. The women confine their hair by gathering and twisting it into one large knot at the back of the head. Both sexes perfume their persons with fragrant oils, and adorn the skin with a variety of powders. The priests generally dress in white, and imitate the turbans of the Arabs.

The male Javan dress is never considered complete without the krís: this is a kind of dagger, with a blade of hardened steel, and of serpentine shape. Distinctions of rank are often expressed by the different modes of wearing this weapon. In the war-dress three krises are usually worn in the waist, one on each side, and the other behind. These consist of the krís which the wearer particularly calls his own, the krís which has descended to him from his ancestors, and the krís which he may have received on his marriage from his wife's father. The last is often placed on the left side, for immediate use. Although the natives at all times carry these dangerous weapons about their persons, yet they must be considered almost exclusively as personal ornaments, for it is very seldom that they are resorted to either as weapons of defence or offence.

The Javanese have but few prejudices regarding food. As Mahommedans they abstain from swine's flesh, and commonly from inebriating liquors. Their chief article of food is rice, but they are also well supplied with fish, flesh, and fowl. They are very fond of the flesh of the horse, but it is not lawful to kill this animal, except when maimed or diseased. The hide of the buffalo, cut into slices, soaked and fried, is a favourite dish. Various kinds of worms or grubs, found in the teak and other trees, are considered as dainties. White ants, in their different states, are one of the most common articles of food, in particular districts: they are collected in different ways, and sold generally in the public markets. Their extensive nests are opened to take out the chrysalis, or they are watched, and swarms of the perfect insect are conducted into basins or trays containing water, where they soon perish.

The cooking utensils are of the simplest kind. Rice is cooked by first pounding it several times in a trough, and then steaming it or boiling it in a small quantity of water. When steamed it is remarkably white and consistent, and in this state it is publicly exposed for sale in the markets and along the high roads. They are very fond of colouring their articles of food: they occasionally make their rice yellow and brown, and even turn their boiled eggs red for variety.

Salted eggs form an important article of their diet. Ducks' eggs are abundant, and are thus preserved:—they are enveloped in a thick covering made of equal parts of salt and ashes, or salt and pounded bricks; and being wrapped each in a large leaf, they are piled up in a tub or large earthen vessel. In ten days they are fit for use; but they are generally kept longer in the mixture, and being thoroughly impregnated with salt, can be kept many months.

On the northern coast a species of soy is prepared from prawns or shrimps: these are strewed with salt, and exposed to the sun till dry: they are then pounded in wooden mortars, dressed, and formed into masses resembling large cheeses: in this state they constitute an article of trade, and are distributed through the country.

The Javanese have two meals a day: the day meal just

before noon, and the evening meal between seven and eight o'clock in the evening. They have no regular meal corresponding with our breakfast, but those who go out early in the morning usually partake of a basin of coffee and some rice cakes before they quit home, or purchase something at one of the numerous stalls which line the public roads, where rice, coffee, cakes, soups, ready-dressed meats, and vegetables, are always to be procured.

In no country are the rights of hospitality more strictly enjoined, or more conscientiously observed. "It is not sufficient," say the Javan institutions, "that a man should place good food before his guest; he is bound to do more: he should render the meal palatable by kind words and treatment, to soothe him after his journey, and to make his heart glad while he partakes of the refreshment."

The Javanese are a sober, amiable, and industrious people; and although they prepare several kinds of fermented drinks they are moderate in the use of them. They have unfortunately acquired some vicious habits from their European rulers, among which the use of opium may be mentioned and deplored.

We are oftentimes in suspense betwixt the choice of different pursuits. We choose one at last doubtingly, and with an unconquered hankering after the other. We find the scheme which we have chosen answer our expectations but indifferently—most worldly projects will. We, therefore, repent of our choice, and immediately fancy happiness in the path which we have declined; and this heightens our uneasiness. We might at least escape the aggravation of it. It is not improbable that we had been more unhappy, but extremely probable that we had not been less so, had we made a different decision.—Shenstone.

That man and that woman who live together quietly and godlily, doing the work of their vocation and fearing God, hearing His word and keeping it, theirs is a religious house; theirs is the house that pleaseth God.—Latimer.

The difference of men is very great: you would scarce think them to be of the same species; and yet it consists more in the affections than the intellect. For, as in the strength of the body two men shall be of an equal strength, yet one shall appear stronger than the other, because he exercises and puts out his strength, while the other will not stir nor strain himself:—so it is in the strength of the brain; the one endeavours, and strains, and labours, and studies; the other sits still and is idle, and takes no pains, and therefore he appears so much the inferior.—Selden.

If we must naturalize that portentous phrase, *a truism*, it were well that we limited the use of it. Every commonplace or trite observation is not a truism. For example: A good name helps a man on in the world. This is nothing but a simple truth, however hackneyed. It has a distinct subject and predicate. But when the thing predicated is involved in the term of the subject, and so necessarily involved that by no possible conception they can be separated, then it becomes a truism, as to say, A good name is a proof of a man's estimation in the world. We seem to be saying something when we say nothing. I was describing to F—— some knavish tricks of a mutual friend of ours. "If he did so and so," was the reply, "he cannot be an honest man." Here was a genuine truism—truth upon truth—inference and proposition identical; or rather a dictionary definition usurping the place of an inference.—Charles Lamb.

Who can contemplate without astonishment the motion of a comet, running far beyond the orb of Saturn, endeavouring to escape into the pathless regions of unbounded space, yet feeling at its utmost distance the attractive influence of the sun; hearing as it were the voice of God arresting its progress and compelling it, after a lapse of ages, to reiterate its ancient course?—Bishop Watson.

ON THE POSITION OF BIRDS AT ROOST.

It may have occurred to some of our readers as an extraordinary circumstance, that the feathered tribes in general are capable of sustaining themselves during sleep in a position so little favourable to repose, as that appears to be which is shown in our wood-cut. It has been noticed, perhaps with surprise, that in this position birds not only sleep in perfect security, but resist the impulse of the wind, and the waving to and fro of the branches on which they rest.

The explanation of this fact was long ago given by the Italian naturalist Borelli, and his explanation has been confirmed by succeeding writers, and is indeed so simple that it may be verified by any one examining the structure of the bird's leg. Our second illustration gives a good idea of it, and represents at *a* the muscle which arises from the haunch-bone of the bird, and which at *b* becomes a tendon, and passes over the outer angle of the thigh-bone, from whence, winding round the leg to *c*, it passes over *that* outer angle likewise, and is finally inserted in the centre of the claw at *d*, where it divides and acts upon each of the toes, in compressing it or the reverse. From this arrangement it is evident that, when the leg is bent to the degree shown in fig. 1, the tendon must be strained much more tightly than it is in fig. 2: it must also be clear that this tightening of the tendon will act mechanically, and without any motion of the muscles, in closing the foot. And this is in fact the case, for when the bird is on its perch the mere weight of the body tends to bend all the joints of the limb on which it rests, and thus, without any muscular effort or volition on the part of the bird, the toes grasp their place of support in the most secure manner.

Many birds support themselves on their perch by means of one leg only, the other being folded close to the body; and in this attitude they are said to be at greater ease, and in a more secure posture than when they rest on both feet, and for this reason,—the weight of the body not being divided between the two points of support, presses the more heavily, stretches the tendons more effectually, and causes the foot to grasp the branch with a tighter hold.

The great expenditure of muscular power that is constantly going on in birds on the wing, makes it the more obviously necessary that there should be no impediment to a perfect state of rest during their roosting hours, and this there would of course be, had they, by any effort of their own, to support their nicely-balanced posture at such times. By the beautiful arrangement above described, the standing posture is their most perfect state of rest.

The formation of the leg and foot in birds is necessarily different from that of the same limbs in quadrupeds, for the foremost extremities being exclusively appropriated to flight, and framed in accordance with the properties of the atmosphere, the hind limbs are kept, as it were, subordinate to this end, and are elongated backwards at a considerable distance from the wings. In order, therefore, to bring the centre of gravity (sustained during flight by the wings) over the basis of support formed by the feet when the bird is at rest, the joints of the leg are bent at very acute angles, and that division which corresponds with the foot in quadrupeds is of much greater comparative length. In addition to this lengthening of the last joint of the leg, the toes are also lengthened and spread out so as to inclose a wide base, over which the centre of gravity is situated.

Thus these animals, while framed with an especial reference to their aërial movements, are adapted likewise to a state of rest, and are fitted to move with more or less facility on the ground. White, of Selborne, characteristically describes the walk of birds.

Most small birds hop; but wagtails and larks walk, moving their legs alternately: all the duck kind waddle; divers and auks walk as if fettered, and stand erect on their

tails; crows and daws swagger in their walk; woodpeckers use their tails, which incline downward, as a support when they run up trees; parrots, like all other hook-clawed birds, walk awkwardly, and make use of their bill as a third foot, climbing and descending with ridiculous caution. All the poultry (*Gallinæ*) parade and walk gracefully, and run nimbly

Fig 1

Fig. 2

INSCRIBED IN A LADY'S POCKET-BOOK.

LIFE'S record what! but sins and follies past;
Be spent the days to come, as tho' the last:
Then this recording page shall mark the year
In which no sighs, but joys alone appear,
Time well bestow'd, stern duty done, sins mourn'd,
Each bright or darken'd day to praise or profit turn'd.—H.

ABLACTATION, *as our old dictionaries call it.*—Old Beuther, in calculating the number of years necessary for replenishing the world after the Deluge, allows two years for suckling a child. This therefore must have been the customary time of lactation in Spain. The Spaniards perhaps received it from the Moors, for Mohammed enjoins mothers to give their infants the breast during two complete years, if they will take it so long. Immediately after laying down this law, the Koran with its usual inconsistency, gives full permission to any body to break it.

King Joam III. of Portugal was not weaned till he was three years and a-half old, and then it was by an act of his own princely pleasure. In that same age it was a common custom in Germany to wean infants after the first month, feed them with cows' milk through a wooden tube, and administer the warm bath every third day.—SOUTHEY'S *Horæ Otiosiores.*

EVERY man has in his own life follies enough—in his own mind troubles enough—in the performance of his duties deficiencies enough—in his own fortunes evils enough—without being curious about the affairs of others.

MAN is not an isolated creature: he is a link of one great and mighty chain, and each necessarily has a dependence upon the other. In society he is like the flower blown in its native bed; in solitude, like the blasted shrub of the desert: neither giving nor receiving support, the energies of his nature fail him, and he droops, degenerates, and dies.

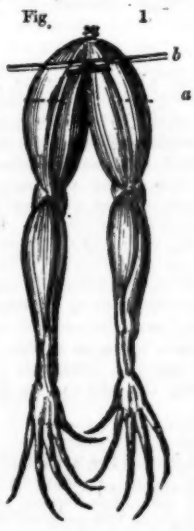
ON VOLTAIC ELECTRICITY.

IN a series of articles contained in the thirteenth and two following volumes of the *Saturday Magazine* we gave a familiar experimental sketch of electricity, commonly so called, and promised to extend our notice to the other departments of this beautiful and prolific science. At the time when our first series of articles was completed, the ground of electrical science was as it were broken up, preparatory to renewed cultivation: the labourers in the field were zealous and indefatigable, and they have already gathered in more than one harvest of new and important results. In the following series of articles we propose to complete our plan, and to present as popular a view as may be consistent with accuracy of the other departments of electrical science.

THE science of galvanism, or voltaic electricity, owes its origin to one of those apparently trifling circumstances which are probably of frequent occurrence, but which appear important only in proportion as the mind is cultivated and prepared to receive them, by previous study of natural phenomena. The rough diamond may be handled by thousands of persons incapable of appreciating its worth; new facts may present themselves to thousands of persons without making a single impression; but the favoured few know how to convert a rough, ill-looking stone into a costly gem fit to adorn the regal coronet, or the apparently insignificant facts into the gem of a new and important science.

In the year 1790, it happened that the wife of Galvani, professor of anatomy at Bologna, was preparing some frogs for the purpose of making soup, and being seated at a table, at which a pupil of the professor was working an electrical machine, the pupil happened to touch the exposed nerve of one of the legs of a frog with the blade of a knife, and observed that the limb was immediately thrown into convulsions. This circumstance was communicated to Galvani, and he at once proceeded to investigate the cause. He found that muscular contractions were excited in the leg of a recently killed frog, when two metals such as zinc and silver were made to touch, one the crural nerve, and the other the muscle connected with it, at the same time bringing the opposite ends of the metals into contact. Galvani supposed that the contractions of the muscles of animals generally were in some way due to electricity. He compared the muscle of an animal to a Leyden jar, charged by the accumulation of electricity on its surface, while the nerve of the animal he compared with the chain which passes into the interior of the jar, so that when a communication was made by means of a conductor between the muscle and the nerve, equilibrium would be suddenly restored, and a contraction of the muscular fibres would result. The progress of inquiry however disproved this ingenious theory.

Fig. 1



The accompanying figure shows the hind legs of a frog prepared for this experiment. The skin is removed, and on gently separating the muscles, the crural nerve *a a* is distinguishable like a white thread passing down them: *b* is a wire, passed under the nerves for the convenience of ensuring metallic contact; if the legs be now folded up and placed upon a plate of zinc, convulsions are produced whenever a metallic communication is made between the wire *b* and the zinc plate. Or we may

place the upper part of the limbs between a penny-piece and a half-crown piece, taking care that the metals are in contact at the top—if one of them be in contact with the muscle, and the other be depressed, so as to touch the nerve, the contractions will be observed as before.

This kind of excitability is retained much longer by cold-blooded animals after death, than by others, and they are affected by states of electricity so feeble as not to be indicated by the most delicate electrometers. A feeble spark, or the most trifling charge of a Leyden jar, is sufficient for the above experiment. It may also be performed with a live flounder, by placing it in a plate upon a slip of zinc, and putting a shilling on its back; then with a piece of wire connected with the zinc make occasional contacts upon the shilling, and at each contact strong muscular contractions are produced. A similar result is obtained with live worms, leeches, &c.

The unpleasant sensations which these animals are thus made to endure, may be received by the following simple experiment:—place a half-crown piece upon the tongue, and a penny-piece below it; no effect is produced while the metals are not in contact; but if we make them touch, a peculiar sharp, arid taste is perceived, and with some persons a flash of light passes before the eyes.

We have already given the hypothesis whereby Galvani sought to explain the above phenomena, but it was controverted by the celebrated Volta, professor of natural philosophy, at Pavia, who showed that the effect depended upon the contact of dissimilar metals, and not upon the connection made between different parts of an animal. He showed that contractions could not be excited by the application of two pieces of the same metal, and he referred the effect when different metals were employed to what is termed the *electro-motive* power of dissimilar metals.

If, for example, two discs of metal, one of zinc and the other of copper, be affixed at their centres to glass handles, and be placed in contact, they are found to be oppositely electrified: when they are removed from each other's influence, the zinc is found to be positive and the copper negative: hence it seems that a portion of electricity has passed from the lesser to the more oxidable metal, and this passage, or transfer, the nerve or muscle of the frog indicates in a very sensible manner.

The chemical properties of metals are much influenced by this disturbance of electricity. For example:—if we hold a strip of silver, and another of zinc, in a test glass containing dilute sulphuric acid, so that the metals do not touch each other, the zinc only will be attacked by the acid, but if we bring the two metals into contact, the silver will immediately become active, and a stream of hydrogen gas will proceed from both metals.

The experiment may also be varied by employing a weak solution of sulphate of copper. Place in it a strip of clean iron and another of silver, keeping them separate. The former will soon be coated with copper, and the latter will remain clean and bright, but if the strips be brought into contact, the silver will also acquire a cupreous coating.

It is to the genius and industry of Volta that we owe the first galvanic apparatus; and we may almost say, that although to Galvani belongs the glory of the first discovery of the site whereon to erect the noble superstructure of this beautiful science, yet Volta must be considered as the architect who drew the plans, laid the foundation, and assisted in the erection of one of the proudest monuments of modern science.

The voltaic pile, so called in honour of its illustrious discoverer, we shall describe hereafter. We may here remark that the identity between common and voltaic electricity is now susceptible of demonstration. These two electricities are excited under different conditions, and they act in different manners. The effects of common electricity are produced by the accumulation of small quantities of the fluid brought into an insulated state, and exerting a high intensity, as shown by its attractive and repulsive forces, and its mechanical action upon non-conducting substances, whereas voltaic electricity may be developed in large quantity, but it cannot be accumulated so as to attain a high degree of tension, and its effects are produced while it flows in a continuous current along conductors, or on a substance placed between two conductors.

If for example we charge a Leyden jar, and then discharge it by means of the discharging rod, the intensity of the discharge will depend upon the extent to which the electricity has accumulated on the interior of the jar, and this again depends upon the time which it has been in connection with the prime conductor of the electrical machine in action; that is, supposing we do not in any case give the jar its full charge. The quantities of electricity sent into it may be indicated by an electrometer attached to the top of the jar. On discharging the jar there will be an explosion, and equilibrium will be immediately established. This, however, is by no means the case with voltaic electricity: there is no accumulation, and, consequently, no discharge: the fluid passes along in currents, and exerts its peculiar action when those currents are interrupted by the interposition of bad conductors.

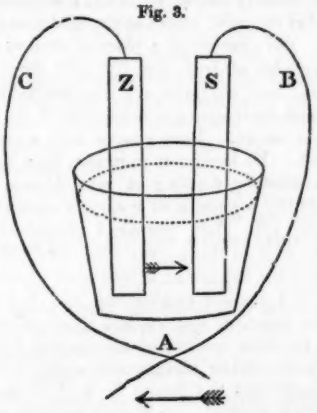
Voltaic currents are simple and compound. In the former case they exist in their most elementary form, and the latter are produced by a series of simple currents or circles acting in mutual connection.

A simple voltaic circle may be formed by immersing two different metals in a dilute acid, and making them communicate by contact at the top, as in the figure, or by attaching wires to the upper ends, and placing the wires in contact. Of the two metals one should be easily acted on by the acid, and the other with greater difficulty or not at all. The greater the dissimilarity in this respect, the more energetic will be the resulting electrical effects. In the figure, z represents a plate of zinc, and s is one of silver, partly immersed in very dilute sulphuric acid, and in contact at their upper ends: by such arrangement a current of electricity appears to be put in motion, passing from the zinc to the acid, from the acid to the silver, and from the silver again to the zinc, as shown by the direction of the arrows.

Fig. 2.

If the metals are connected by means of wires, as shown in fig. 3, the circuit may be extended, and by

Fig. 3.



prolonging the wires it may be made to travel many miles. In this case the direction of the current is from the zinc z through the liquid to the silver s, down the wire B; from the latter to the wire C, and so back to the zinc plate. The advantage of this arrangement over the

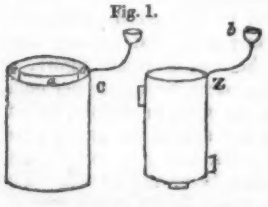
one before described is, that the current can be intercepted and operated with by placing a substance at A, and *closing** the current upon it.

In the foregoing arrangements the wire B, attached to the silver plate, conveys electricity to the wire C, attached to the zinc plate: B, therefore, is called the *positive pole*, because the electric current flows in a continual circuit, passing from the zinc to the acid, from the acid to the silver, and along the wires back to the zinc, so that we may suppose the wire B to be continually imparting electricity to the wire C: hence, the latter is the *negative* pole, and, according to the theory of the two fluids, a current of negative electricity ought to set in, in an opposite direction: but it will be convenient for us hereafter to trace the progress of the + or positive current only, not forgetting, however, that the transfer of any quantity of + electricity in one direction implies the transfer of a similar quantity of — or negative electricity in an opposite direction.

The simple voltaic circle last described may be conveniently modified by interposing a piece of flannel, dipped in dilute acid, between a plate of copper and one of zinc, instead of immersing the metals in the acid solution; or the copper may be shaped into the form of a vessel for containing the acid, and the zinc plate may be suspended in it, care being taken to support the latter by means of cork, to prevent the two metals from coming in contact.

There is also another useful modification of the simple circle. C is a vessel formed of two cylinders of sheet copper, placed one within the other, and closed at the bottom. Z is a cylinder of zinc, with a few pieces of cork attached, to prevent it from touching the interior sides, *a a a*, of the copper vessel, when it is placed between them. *b b* are small copper cups soldered on to conducting wires, and containing a little mercury, for the purpose of conveniently making the circuit, by the insertion of wires into the cups, or breaking it by removing them. The zinc cylinder being placed between the copper cylinders, and dilute acid being poured in, a simple galvanic circle is formed the moment metallic connection is made between the two little cups.

Fig. 1.



We have hitherto supposed that the zinc employed in these experiments is used in a pure state. Such, however, is not the case in practice, nor is it necessary to be so. The zinc usually employed in the construction of galvanic apparatus contains traces of tin, lead, and a small portion of iron. On immersing a piece of zinc in dilute acid, the small particles of iron and the zinc form numerous voltaic circles, their currents are transmitted through the acid, and much hydrogen gas is generated by the decomposition of the water. Pure zinc is very slowly acted on by dilute acid. If, however, common zinc have its surface amalgamated by dipping it into dilute nitric acid, and then rubbing a globule of mercury over it, by means of a cork, the zinc thus prepared resists the action of dilute acid as well as the purest zinc; and the advantage gained is that the apparatus is less slowly corroded—the minute currents are not established, and thus the general results of the principal current are more effective.

We have hitherto spoken of the current formed by the action of two dissimilar metals and a liquid acid, but it is not necessary that the liquid be acid; it may be alkaline—it may be neutral—or it may be pure water only; but in the last case the electric current is so feeble as not to be detected by ordinary tests. In every case, however, the current gives an additional effect to the affinity of one of the metals for some element in the liquid employed, and the affinity of the other metal for any one of the elements in the liquid is proportionally diminished. When a piece of zinc and another of copper are brought into contact in dilute acid, the zinc oxidizes more and the copper less rapidly than without such contact. This principle was applied by Sir Humphry Davy to the preservation of the copper sheathing of ships. If a sheet of copper be immersed in sea-water, or in a solution of common salt, it becomes rapidly corroded, and an oxy-chloride of copper is generated. The vessel containing the copper and the solution must be exposed to the air, of which a notable quantity is always taken up by water exposed to it. In this case, therefore, the oxygen of the air so absorbed by the water, unites with a portion of the copper, and with the sodium of the salt; the latter, being composed of sodium and chlorine, gives chlorine to another portion of the copper, and the oxide and chloride of copper thus formed combine. But if the copper be in contact with zinc, or some metal more readily oxidizable than copper, it is alone acted on, and the copper is preserved. In this way the copper sheathing of ships may be preserved, and the quantity of zinc necessary to form a preservative voltaic circle with the copper is exceedingly small. A piece of zinc no larger than the head of a small round nail is sufficient to preserve between forty and fifty square inches of copper, the surface of which remains quite bright, while the zinc only is corroded.

When, however, the copper is thus rendered an electro-negative body it becomes attractive of metals and their oxides and other compounds, which, as respects the protected copper, are electro-positive bodies: among such are the earthy bodies contained in sea-water, such as lime, magnesia, and their compounds: when, therefore, a ship covered with protective copper was put to sea, the copper was soon covered with a crust of earthy matter, which acted as an additional preservative, but gave rise to a new and unforeseen difficulty: sea-weeds and a variety of marine animals attached themselves so abundantly to the ship's bottom as to impede the sailing of the vessel, and thus this beautiful application of galvanic science was necessarily abandoned.

* A current is said to be *closed* when metallic contact between the plates or conducting wires is made; and the current is said to be *broken* when such is not the case.

THE false modesty of the insignificance of such a being as man has always encouraged modern unbelievers to call in question the moral government of God. To this topic the Duke of Marlborough (who, without doubt, had often heard it urged in the licentious court in which he had been brought up), evidently alludes, when he says to the Duchess, in his letter of August 26, 1709,—"I cannot help being of opinion, that, *however insignificant we may be*, there is a Power above that puts a period to our happiness or unhappiness. If anybody had told me, eight years ago, that, after such success, and after you had been a faithful servant twenty-seven years,—that ever in the queen's life-time we should be obliged to seek happiness in a retired life, I could not have believed that possible."—WARBURTON.

BY continual meditation in the sacred writings, a man as naturally improves and advances in holiness, as a tree thrives and flourishes in a kindly and well-watered soil. All the fruits of righteousness show themselves at their proper season as opportunity calls for them; and his words, which are to his actions what the leaves are to the fruit, fall not to the ground, but are profitable as well as ornamental. Everything in him and about him serves the purpose for which it was intended; his brethren are benefited by him, and his Maker is glorified. How eminently is this the case with that tree of life which Jehovah planted in the midst of his new paradise, by the waters of comfort; a tree which sprung out of the earth, but its height reached to heaven, and its breadth to the ends of the world! its shadow is for the protection, its fruit for the support, and its leaves for the healing of the nations. It flourishes in immortal youth, and blooms for ever in unfading beauty.—BISHOP HORNE.

PROPOSED ROUTE TO THE PACIFIC ACROSS THE ISTHMUS OF PANAMA.

In various parts of the globe we find narrow necks of land which, by separating oceans, seas, or bays from each other, render necessary a more circuitous route for those who travel by ship from one to the other. The well-known isthmus of Suez affords a striking example of this kind. The Red Sea, which is connected with the ocean immediately contiguous to India, is so near the eastern end of the Mediterranean that if a canal or strait communicated from one to the other, the voyage to India would be shortened many thousand miles, by rendering unnecessary the circuitous route round the Cape of Good Hope. So important is this consideration, that even now the officers of the Indian army are accustomed to travel by land across the narrow isthmus which separates the two seas, and we doubt not that a canal or a railroad will one day be formed in that spot.

Another instance of a similar kind, but not so well known, is the isthmus which connects North and South America, and which separates the Atlantic from the Pacific; this is the Isthmus of Panama, or of Darien. As there are, at the present time, projects on foot for establishing a route to the Pacific *viâ* this isthmus, we will briefly explain the nature of the difficulties to be overcome.

On inspecting a map of America, we see that the two portions of that great continent are connected by a singular strip of land, most irregular in all its forms. It is principally comprised by a part of Mexico and the Republic of Guatemala; but, at its southern extremity, near the junction with South America, the strip of land becomes narrower than at any other part, and obtains the name of the Isthmus of Panama, or of Darien, (Panama being the name of a town on the Pacific side, and Darien that of another on the Atlantic side.) The Andes, generally speaking, stretch along the whole strip of land; but there are a few spots where such is not the case; and there is also one locality in which a lake occupies a considerable portion of the width of the isthmus. These two circumstances have led to the projects which we proceed to describe.

Humboldt enters at considerable length into the subject of a passage across the isthmus, and enumerates no fewer than nine different routes, all of which might be *possible* for a canal: the gigantic nature of his plans, however, caused them to be viewed as impracticable. By about the year 1825, the attention of merchants, both in England and in America, being turned to this subject, Captain Pitman published a volume, in which he examines the relative merits of five different routes across the isthmus. One of these was from the Gulf of Darien, close to the shore of South America, across a narrow part of the isthmus, to the Gulf of St. Michael, in the Pacific coast; this would require a ship canal about forty miles in length, and cutting through the hills so stupendous as to render improbable, however possible, the prosecution of such a plan. The second route mentioned by Captain Pitman is somewhat westward of the former; the ground has fewer elevations than the former, but the ports at either end of the route were deemed so defective as to be unfit for the reception of large merchant ships. The third route proposed was at a spot, close to the southern end of the isthmus, where the chain of the Andes is so completely broken as to afford a flat alluvial soil, from a river which flows into the Atlantic, to another which flows into the Pacific; it was proposed to connect these two rivers by a canal, but the rivers themselves are said to be too small and shallow to receive any but small craft. The fourth route was some hundreds of miles to the north-west, where the width of the isthmus was practically lessened by the intervention of a lake. The fifth route was in the state of Mexico, at that part of the isthmus which approaches to North America; the width here, at one part, is about a hundred and fifty miles, a considerable portion of which is occupied by two rivers, which it was proposed to connect by a canal. The object of Captain Pitman was to examine the relative practicability of the several proposed routes, and to point out some of the difficulties, but not to advocate any one in particular.

In November, 1827, Mr. Lloyd, an officer under Bolivar, (who was then chief of the Republic to which the Isthmus of Panama belonged,) received instructions to survey the isthmus, in order to ascertain the most eligible line of communication across it, either by road or canal, with a view to establish regular commercial intercourse from the Atlantic to the Pacific. Mr. Lloyd made a very careful examination of the height of the ground between the two seas, and also of the level of the seas themselves, both of which are obviously important in relation to the cutting of a canal. He found that the highest spot of ground, in that route, which was deemed the most level, was 633 feet above the Pacific. He found also that the level of the two oceans was subject to singular changes; for, in every twelve hours, and commencing with high tides, the level of the Pacific is first several feet higher than that of the Atlantic; it becomes then of the same height; at low tide it is several feet lower; again, as the tide rises, the two seas become of one height; and finally, at high tide, the Pacific is again the same number of feet above the Atlantic as at first. These variations are due to the circumstance that the rise and fall of the tide are greater on the Pacific than on the Atlantic side of the Isthmus. What effect this inequality would have on a water communication from the one ocean to the other is an important question in canal engineering.

Mr. Lloyd was of opinion that a communication could be formed across the isthmus, partly by river navigation, and partly by railroad. There is on the Atlantic side a sea-port, called Chagres, and another on the Pacific side, called Panama, and the country between them is so entirely free from mountains that the greatest height is, as before mentioned, 633 feet. A river, which enters the Atlantic at Chagres, is navigable to a considerable extent into the isthmus; and Mr. Lloyd proposed to construct a harbour and other maritime conveniences near its mouth. At a certain point in the interior a station was fixed upon at which the travellers or the merchandize would leave the river, and thence be forwarded by land the remainder of the distance to Panama, a railroad being formed for that purpose.

It need hardly be observed that such a project as this could not be carried out unless the government of the country were in a tolerably settled state, and considerable capital were afloat therein. How totally different from this has been the condition of these wretched republics of Central and South America, is well known to those who have paid any attention to the events of the past fifteen years. Nothing has since been done to follow out the plans of Mr. Lloyd.

A few years after the mission of Mr. Lloyd, a circumstance occurred to direct attention to another part of the isthmus, which, though not so narrow as that between Chagres and Panama, has a central lake, and a river flowing from thence into the Atlantic. In the month of January, 1833, the Spanish merchants residing at Kingston, Jamaica, and connected with the commerce of Central America, requested the senior naval officer at Port Royal to allow a certain extension of the voyage made by the mail-packets in that region, with a view of establishing a communication, by commerce and correspondence, with the towns near and around the lake here alluded to, called Lake Nicaragua. The river San Juan de Nicaragua flows from the lake into the Atlantic; and the Jamaica merchants thought that, if a monthly communication were kept up between Jamaica and the town

of San Juan at the mouth of the river, a great accession of commercial dealings would result.

Captain Phillips, who communicated a letter to the Geographical Society of London in relation to this subject, draws a comparison between the route to the Pacific by the way of Panama, and that by way of Lake Nicaragua, and says,—

The passage by Panama leads alone to the Pacific, whilst the passage by San Juan de Nicaragua would affect the whole of the internal commerce of Costa Rica and Central America, and most likely be not only the means of a commercial transit to the South Seas, but, from the influx of strangers, and the interchange of ideas naturally arising from it, would tend to enlighten this district of the country, which civil war, with all its horrors, is fast driving to the lowest stage of ignorance and barbarism.

We fully join in the opinion that, if a commercial route could be established in any part of this isthmus, an amount of moral benefit might result, fully equal in extent to that which would be derived by commerce.

The Lake Nicaragua, which is proposed to form part of the route last spoken of, is upwards of a hundred and twenty miles in length, and forty in breadth at its widest part, without narrowing much at either end. It is interspersed with islands, some of which are of great height. On this inland sea the Spaniards, when Central America belonged to them, kept a marine, consisting of a brig of war, of fourteen guns, and several schooners, or gunboats, so that its fitness for navigation is manifest. An English merchant had, nine years ago, a schooner of forty tons' burden, engaged in commercial enterprises on the lake. On the shores of the lake are two flourishing towns, Grenada and Nicaragua, the latter being only fourteen leagues' distance from a convenient port on the Pacific. Hence arose the idea of forming the communication by this route; for the lake can be attained through the river, which flows from it into the Atlantic, and the rest of the journey, fourteen leagues to the Pacific, would have to be traversed by road, railway, or canal, according to the nature of the ground and the views of the speculators.

After it became evident to the merchants who traded in those regions that the proposed communication might be made, the points for discussion were, whether a canal or a railway would be best adapted for the portion of the route between the lake and the Pacific, and by whom and what funds the enterprise should be undertaken? If the government of the Republic could not or would not effect it, then a private company, sanctioned by the government, must do it. Both of these questions remain unsettled to this day. A few years ago, Mr. Bailey, having ascertained the possibility of constructing a railroad from the lake to the Pacific, the Columbian government granted him two thousand dollars for the purpose of making investigations respecting the other part of the route. The river San Juan flowing from the lake into the Atlantic, cannot at all times be ascended by ships, on account of rapids and shallows which interrupt some parts of its course, and Mr. Bailey was empowered to examine the river, with a view to ascertain the practicability of constructing a canal which would avoid these obstructions. But long before the completion of the investigation, the money was expended, the engineer and his assistants were disabled by sickness, and the anarchy in which the country was placed put an end to any further aid from the government.

In the month of March, 1840, while H. M. S. *Thunder* was engaged in the survey of the eastern coast of Central America, Mr. Laurence, an assistant surveyor, with a crew of six native canoe-men, voyaged up the river San Juan, from its mouth to the lake, in a canoe. The results of that voyage, as far as regards the nature of the surrounding country, were interesting, but it was fully proved that no ship or steamboat could ascend the whole course of the river from the sea, except under extraordinary circumstances of wind and tide. Captain Barnett, of the ship *Thunder*, in a paragraph in the *Nautical Magazine*, states,—

Mr. Bailey is said to have been employed by a company of American speculators. This, however, is not the fact, although the merchants concerned in the South Sea fishery are extremely anxious to effect a communication; but nothing will be undertaken by them unless they are convinced it can be accomplished by the way pointed out in Mr. Bailey's mission, which, by affording the means of rapid transport of the cargoes and supplies, would enable the whalers to remain entirely in the Pacific. Of course the spur which would be also given to the commerce of Central America is not lost sight of, but the anarchy, confusion, and distrust which now so ruinously degrades this disruptured Republic, throws the prospect of such desirable results to an immeasurable distance.

The opinions here expressed, as to the fatal effects which national anarchy exerts in the prosecution of such an enterprise, is shared by others who have since visited the country. The Chevalier Emanuel Friedrichsthat, who has recently traversed the district bordering on the isthmus, found the civilization of Central America to be in a very low state of developement. Indolence is there the vice of all classes; and though public spirit is not absolutely wanting, yet those who are animated by it have neither the union nor the energy requisite to enable them to cope with the disturbers, by whom the country is kept in a state of anarchy. A territory of 28,000 square leagues is there possessed by only 2,000,000 of inhabitants; and this scanty number has decreased rather than increased during the discord and confusion of the last sixteen years.

Under such circumstances, (says M. Friedrichsthat,) the important question of a union of the two oceans has been entirely forgotten; and I believe that I do not err in asserting that Europe pays far more attention to this grand project than the inhabitants of Central America, wholly unacquainted as they are with the advantages of an extensive commerce, and with the means of promoting it. It is also not to be expected that this state, with its limited resources, should ever be able to accomplish such a work; and it was therefore proposed, before the last war, to engage some mercantile houses of Paris in the execution of this project, the recompense consisting of tolls and fifty square acres of land.

A point has been found where the Lake Nicaragua approaches within sixteen miles of the Pacific, but a hill, six hundred feet high, would have to be cut through in forming the passage; and it is evident that M. Friedrichsthat's remarks apply with full force to the commercial and financial difficulties of such a piece of engineering in the present state of the country.

Not many weeks ago a meeting was held of merchants in London, connected with the South Sea trade, with a view of establishing a Joint Stock Company, for working out the plan in one or other of its forms. Opinions were stated as to the relative advantages of a railway and a canal, and the general feeling seemed to be that the project was neither a wild nor an impracticable one. A few years of tranquillity in Central America would doubtless bring about the fulfilment of this great undertaking.

IN all the operations of Nature there is a view to the future: it should be so with the actions of man; and those pursuits which have no other aim beyond mere present gratification, are unworthy of him.—SOUTHEY.

IN your commerce with the great, if you would have it turn to your advantage, you should endeavour, if the person be of great abilities, to make him satisfied with *you;* if he be of none, to make him satisfied with *himself.*—WARBURTON.

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